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EXAMINER
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SYKES, ALTREV C

ART UNIT	PAPER NUMBER
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1794

NOTIFICATION DATE	DELIVERY MODE
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03/18/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/591,165	<b>Applicant(s)</b> KUROKI ET AL.	
	<b>Examiner</b> ALTREV C. SYKES	<b>Art Unit</b> 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                                                             |                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                                 | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                                                         | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>20070205, 20070323</u> . | 6) <input type="checkbox"/> Other: ____.                                                |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement filed March 23, 2007 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. Specifically, the WO 99/02586 and JP 6-25446 documents require an English translation to be submitted. Document JP-2767329 was noted to have not been submitted at all. It has been placed in the application file, but the information referred to therein has not been considered.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "the volatile component". There is insufficient antecedent basis for this limitation in the claim because this claim depends on claim 7 which does not recite a volatile component. Further, there is no volatile component recited in claim 1 from which claim 7 is dependent.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 9-14, 17-20, 24, and 25 are rejected under 35 U.S.C. 102(b) as being anticipated by Ozaki et al. (US 6,027,794).

Regarding claims 9, 12, 20, 24, Ozaki et al. discloses preregs, comprising long reinforcing fibers as components [A], a matrix resin as component [B] and long thermoplastic resin fibers as component [C], with the component [C] distributed near either or both of the surface layers without being regularly arranged. (See Abstract) Ozaki et al. the component [C] is made from long fibers of a thermoplastic resin and is distributed at random near the surface layer of the prepreg. The random distribution can also be realized by using a long-fiber nonwoven fabric. (See Col 8, lines 47-49 and 58-59) It is noted by examiner that applicant discloses that the element [C] as claimed means a thermoplastic fabric such as a nonwoven. (See instant specification [0063]) Therefore, examiner equates the component [C] of Ozaki et al. with the element [C] of applicant. The preregs are used for the preparation of fiber reinforced plastics. (See Col 1, lines 10-15)

Further regarding claim 24, Ozaki et al. discloses the preregs are used for the preparation of fiber reinforced plastic composite material. (See Col 1, lines 10-20) Ozaki et al. discloses layers of the prepreg are laminated and cured to obtain a composite

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material. (See Col 5, lines 49-51) It should be noted that the recitation of “outer panel” is considered to be an intended use statement and is not given patentable weight at this time since the prior art meets the structural and/or chemical limitations set forth and there is nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the term.

Regarding claim 10, Ozaki et al. discloses the component [C] is distributed near the surface layer of the prepreg, but does not cover the entire surface, so it can be easily impregnated with the matrix resin, to exhibit the tackiness and drapability of the matrix resin as the properties of the prepreg, and so render the prepreg excellent in handling convenience. (See Col 9, lines 4-9)

Regarding claim 11, Ozaki et al. discloses all of the claim limitations as set forth above. It is noted by examiner that applicant discloses that the element [C] as claimed means a thermoplastic fabric such as a nonwoven fabric because of its’ permeability. (See [0064]) Applicant further discloses that a thermoplastic resin having openings and a continuous form include a woven fabric, a knitted fabric, a mesh, and a perforated film. (See [0069]) Ozaki et al. discloses component [C] may be a woven or knitted fabric. (See Col 8, lines 50-55) Therefore, examiner has reason to believe that the component [C] as disclosed by Ozaki et al. would meet the limitation of having an opening content in a range from 15% to 90%.

Regarding claim 13, Ozaki et al. discloses to obtain desirable physical properties it is desirable to keep the areal weight of component [C] as uniform as possible. (See Col

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9, lines 1-3) Ozaki et al. discloses component [C] may be a polyamide such as nylon. (See Col 30-33) In Example 1, Ozaki et al. discloses the nylon fiber have an areal weight of  $13.0\text{g/m}^2$ . (See Col 12, lines 63-67)

Regarding claim 14, Ozaki et al. discloses the reinforcing fibers may be formed as a sheet, mat, or woven fabric. (See Col 3, lines 51-54)

Regarding claim 17, Ozaki et al. discloses the component [C] is made of a thermoplastic resin such as polyamides, polyacetals, polyphenylene oxide, polyimides, polyether imides, polyether sulfones, polyether ether ketones, and polyaramid which are excellent in impact resistance and suitable as materials for nonwoven fabrics. (See Col 9, lines 19-26)

Regarding claims 18 and 19, it should be noted that the recitation of “for a honeycomb self-adhesion” and “for an outer panel” is considered to be an intended use statement and is not given patentable weight at this time since the prior art meets the structural and/or chemical limitations set forth and there is nothing on record to evidence that the prior art product could not function in the desired capacity or that there is some additional implied structure associated with the term.

Regarding claim 25, as the structures of the Ozaki et al. reference has been shown to be substantially similar to that as claimed by applicant and comprising all claimed elements, it is noted that the property of surface pits with depth of  $50\text{ }\mu\text{m}$  or deeper is 2 or less per  $10\text{ cm}^2$  in the surface would have been readily provided for by the laminated material.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
8. Claims 1-3 and 5-7 are rejected under 35 U.S.C. 103(a) as being obvious over Kishi et al. (EP 0559437) in view of Sugimori et al. (US 6,670,006).

Regarding claims 1 and 3, Kishi et al. discloses a resin composition including an epoxy resin, a curing agent and a rubber (preferably solid). (See pg. 3, lines 16-17) Kishi et al. discloses the epoxy resin may contain a glycidylamine type epoxy resin such as tetraglycidyl diaminodiphenylmethane. (See pg. 3, lines 53-56) Kishi et al. discloses the epoxy resin may be a mixture of two or more epoxy resins. (See pg. 4, lines 6-8) Kishi et al. discloses an aromatic diamine may be used as the curing agent. (See pg. 4, lines 25-26) Kishi et al. discloses acrylonitrile-butadiene is the preferred rubber and may be 3-12 parts by weight in 100 parts by weight of the matrix resin composition. (See pg. 4, lines 48-51 and pg. 5, lines 20-23) Kishi et al. discloses the resin composition is used for a

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cured composite. (See Abstract) Kishi et al. discloses all of the claim limitations as set forth above, but the reference is silent as to an epoxy resin having oxazolidone rings and an glass transition temperature of 160 to 220°C after heat curing at 180°C for 2 hours.

Sugimori et al. discloses an epoxy resin composition comprising an epoxy resin having oxazolidone rings (component B), and a curing agent (component C). (See Abstract) Sugimori et al. discloses the epoxy resin having oxazolidone rings is essential for high crushing strength. (See Col 4, lines 12-14) Sugimori et al. discloses the curing agent may be an amine compound. (See Col 5, lines 27-30) Sugimori et al. further discloses the composition may contain a component E selected from a glycidylamine-type resin.

As Kishi et al. and Sugimori et al. are both directed to curable epoxy resins, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art motivated by expected success to utilize the epoxy resin having oxazolidone rings as taught by Sugimori in the composition as disclosed by Kishi et al. since the Kishi reference discloses that a mixture of two or more epoxy resins may be used. It is noted by examiner that the composition of Sugimori et al. would have been well known in the art at the time of applicant's invention and therefore one of ordinary skill in the art would have been easily motivated to improve the crushing strength of the final Kishi resin for end use by utilizing an additional epoxy resin having oxazolidone rings. (See Col 4, lines 12-14)

As the composition of modified Kishi et al. has been shown to be substantially similar in component make-up as that claimed by applicant, examiner has reason to



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believe that the glass transition temperature of 160 to 220°C after heat curing at 180°C for 2 hours would have been a result effective variable. It is noted that while Sugimori does not disclose the use of a solid rubber in the epoxy composition, the reference contains examples which provide evidence that the components of the composition would effect the glass transition temperature calculated. This is seen in Table 1 for a composition that comprises only components A, B, C, and E versus glass transition temperature values calculated in Table 5 for a composition comprising components A, B, C, D, and E. Further, it is noted that one of ordinary skill in the art would have been easily motivated to adjust the time and temperature parameters of the curing conditions. Sugimori discloses curing conditions at 130°C for one hour. (See Col 13, lines 1-2) It would have been obvious to one having ordinary skill in the art at the time the invention was made to create curing parameters for obtaining a preferred glass transition temperature since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the present invention, one would have been motivated to optimize the curing parameters for obtaining a preferred glass transition temperature with the desire to tailor the final cured product containing the epoxy resin for end use such as for structural components of airplanes, automobiles and the like. (See Kishi pg. 2, lines 9-14).

Regarding claim 2, Kishi et al. discloses a Bisphenol A type epoxy resin in an amount of 10-60wt% with a tetraglycidylidiaminodiphenyl methane resin in an amount of 10-40wt%. (See pg. 4, lines 10-20) While Kishi doesn't disclose the oxazodilone ring resin, Sugimori et al. discloses compositions in which the oxazodilone ring resin is

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present in amounts of 20-70% by weight of the total of the epoxy resin components. (See Table 1, Col 14) Therefore, one of ordinary skill in the art would have been easily motivated to substitute the oxazodilone ring resin as taught by Sugimori et al. for the Bisphenol A type epoxy resin as disclosed by Kishi et al. Further, it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the weight percent of each epoxy resin since it has been held that, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The burden is upon the Applicant to demonstrate that the claimed weight percent of each epoxy resin is critical and has unexpected results. In the present invention, one would have been motivated to optimize the weight percent of each epoxy resin motivated by the desire to tailor the final cured product containing the epoxy resin for end use such as for structural components of airplanes, automobiles and the like. (See Kishi pg. 2, lines 9-14).

Regarding claim 5 Sugimori et al. further discloses a  $G_{IC}$  of 400 J/m<sup>2</sup> or more is particularly preferable. (See Col 7, lines 9-13 and Table 1)

Regarding claim 6 Sugimori et al. further discloses the epoxy resin composition for a FRP is required to have a viscosity of 100 to 5,000 poises measured by the described method for measuring viscosities. If the viscosity of the epoxy resin composition for the FRP is less than 100 poises at 60°C, the tack becomes too strong or the resin flow at the time of molding becomes too great, making it impossible to obtain the intended properties after the molding, which is unpreferable. Furthermore, if the

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viscosity of the epoxy resin composition for the FRP is over 5,000 poises, the impregnation with the resin at the time of formation of a prepreg becomes insufficient, the tack is lost to too great an extent, or the prepreg becomes hard, making it impossible to obtain the intended properties after the molding, which is unpreferable. A more preferable range is from 300 to 3,000 poises. (See Col 5, lines 55-68 and Col 6, lines 1-4) Examiner notes that 100 to 5,000 poises is equivalent to 10 to 500 Pa.s which would overlap the range as claimed by applicant. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the viscosity since it has been held that, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The burden is upon the Applicant to demonstrate that the claimed viscosity is critical and has unexpected results. In the present invention, one would have been motivated to optimize the viscosity motivated by the desire to control the tack of the resin to tailor the intended properties after molding. (See Col 5, lines 55-68).

Regarding claim 7, modified Kishi et al. discloses all of the claim limitations as set forth above. Sugimori et al. discloses a prepreg comprising a sheet of reinforcing fibers impregnated with an epoxy resin composition for an FRP. (See Col 2, lines 48-50)

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being obvious over Kishi et al. (EP 0559437) in view of Sugimori et al. (US 6,670,006) as applied to claim 1 and further in view of Kouchi et al. (WO 03/040206)

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This rejection is over WO 03/040206 because the reference qualifies as prior art under 102(b). However, for convenience, the column and line numbers of the English language equivalent and national stage entry, US 2004/0247882, will be cited below.

Regarding claim 4, modified Kishi et al. discloses all of the claim limitations as set forth above, but the reference does not specifically disclose wherein the glass transition temperature of the cured material after immersion of the cured material in boiling water for 2 days is in a range from 110 to 150°C.

Kouchi et al. disclose a liquid epoxy resin composition for low cost production of high performance fiber reinforced composite material. (See [0015]) Kouchi et al. disclose preferred epoxy resins comprise di- or higher functionality such as tetraglycidylidiaminodiphenyl methane and an epoxy resin having oxazolidone rings. (See [0088]-[0089] and [0111]) Kouchi et al. disclose epoxy resin compositions for fiber reinforced composite material to be used in the aerospace industry are required to be small in the decrease in glass transition temperature caused by water absorption, as well as able to form a cured product with a high glass transition temperature. Accordingly, the epoxy resin composition, after being cured for two hours at 180°C and immersed in boiling water for 48 hours, preferably have a glass transition temperature of 130°C or more. (See [0141]) Kouchi et al. discloses by meeting these requirements, the resulting fiber reinforced composite material comprising a cured product of said epoxy resin composition as a matrix can have a high compressive strength in wet heat. (See [0044])

As modified Kishi et al. and Kouchi et al. are directed to epoxy resin compositions, the art is analogous. Therefore, it would have been obvious to one of

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ordinary skill in the art at the time of the invention to utilize the curing conditions of Kouchi et al. in place of the conditions as disclosed by modified Kishi et al. in order to provide a cured product having high compressive strength in wet heat which would be favorable for the aerospace industry. (See [0044])

10. Claims 1-4 and 7 are rejected under 35 U.S.C. 103(a) as being obvious over Kouchi et al. (WO 03/040206) in view of Kishi et al. (EP 0559437).
11. This rejection is over WO 03/040206 because the reference qualifies as prior art under 102(b). However, for convenience, the column and line numbers of the English language equivalent and national stage entry, US 2004/0247882, will be cited below.

Regarding claims 1, 3, 4, Kouchi et al. disclose a liquid epoxy resin composition for low cost production of high performance fiber reinforced composite material. (See [0015]) Kouchi discloses preferred epoxy resins comprise di- or higher functionality such as tetraglycidyl-diaminodiphenyl methane and an epoxy resin having oxazolidone rings. (See [0088]-[0089] and [0111]) Said epoxy resin compositions should, after being cured for two hours at 180°C, preferably have a glass transition temperature of 170°C or more. (See [0040]) Epoxy resin compositions for fiber reinforced composite material to be used in the aerospace industry are required to be small in the decrease in glass transition temperature caused by water absorption, as well as able to form a cured product with a high glass transition temperature. Accordingly, the epoxy resin composition according to the invention should, after being cured for two hours at 180°C and immersed in boiling water for 48 hours, preferably have a glass transition temperature of 130°C or more. (See

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[0141]) Kouchi et al. discloses by meeting these requirements, the resulting fiber reinforced composite material comprising a cured product of said epoxy resin composition as a matrix can have a high compressive strength in wet heat. (See [0044]) Kouchi discloses all of the claim limitations as set forth above but does not disclose a solid rubber compound.

Kishi et al. discloses a resin composition including an epoxy resin, a curing agent and a rubber (preferably solid). (See pg. 3, lines 16-17) Kishi et al. discloses the epoxy resin may contain a glycidylamine type epoxy resin such as tetraglycidyl diaminodiphenylmethane. (See pg. 3, lines 53-56) Kishi et al. discloses the epoxy resin may be a mixture of two or more epoxy resins. (See pg. 4, lines 6-8) Kishi et al. discloses an aromatic diamine may be used as the curing agent. (See pg. 4, lines 25-26) Kishi et al. discloses acrylonitrile-butadiene is the preferred rubber and may be 3-12 parts by weight in 100 parts by weight of the matrix resin composition. (See pg. 4, lines 48-51 and pg. 5, lines 20-23) Kishi et al. discloses the resin composition is used for a cured composite. (see Abstract) Kishi et al. discloses all of the claim limitations as set forth above, but the reference is silent as to the an epoxy resin having oxazolidone rings and an glass transition temperature of 160 to 220°C after heat curing at 180°C for 2 hours.

As Kouchi et al. and Kishi et al. are both directed to curable epoxy resins, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art motivated by expected success to utilize the acrylonitrile-butadiene rubber as taught by Kishi et al. in the composition as disclosed by Kouchi et al. for the added benefit of providing high viscosity and high thixotropic properties. (See pg.4, lines 45-46)

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Regarding claim 2, Kouchi et al. also discloses a way to prevent the glass transition temperature from being decreased by water absorption is to use, as said epoxy resin component with tri- or higher functionality, at least one epoxy resin selected from the group of N,N,N',N'-tetra-glycidyl-4,4'-diaminodiphenylmethane and its alkyl-substituted derivatives, in combination with at least one epoxy resin selected from the group of N,N-diglycidyl aniline and its alkyl-substituted derivatives as said epoxy resin component with di- or higher and lower than tri-functionality. (See [0086] and [0142]) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the weight percent of each epoxy resin since it has been held that, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The burden is upon the Applicant to demonstrate that the claimed weight percent of each epoxy resin is critical and has unexpected results. In the present invention, one would have been motivated to optimize the weight percent of each epoxy resin motivated by the desire to tailor the final cured product containing the epoxy resin for end use such as for structural components of airplanes, automobiles and the like. (See Kishi pg. 2, lines 9-14).

Regarding claim 7, Kouchi discloses cured products of epoxy resin compositions designed for production of fiber reinforced composite material (i.e. preregs) to be used in the aerospace industry are required to have many good properties. (See [0013] and [0052])

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12. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being obvious over Ozaki et al. (US 6,027,794).

Regarding claims 15 and 16, Ozaki et al. discloses all of the claim limitations as set forth above, but the reference does not explicitly disclose wherein the minimum weight per  $1\text{cm}^2$  of the constituent element [C] in one face side of the prepreg is 20% or higher of the average weight per unit surface area. Ozaki et al. is also silent as to the weight ratio of the constituent elements [A], [B], and [C] satisfies a range of 1 to 1.5.

However, Ozaki et al. discloses the distribution near the surface layer means that more than 90% of the component [C] exists in a region from the surface of the prepreg to 30% of the thickness of the prepreg. When, as is preferred, more than 90% of the component [C] exists in a region from the surface of the prepreg to 20% of the thickness of the prepreg, the effect of the present invention can be exhibited more remarkably. (See Col 9, lines 45-52) A suitable amount of the component [C] is 2 to 30 wt % based on the total weight of the components [B] and [C] in the prepreg or composite material. (See Col 10, lines 58-60) Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the minimum weight per  $1\text{cm}^2$  and weight ratio since it has been held that, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The burden is upon the Applicant to demonstrate that the claimed minimum weight per  $1\text{cm}^2$  and weight ratio is critical and has unexpected results. In the present invention, one would have been motivated to optimize the minimum weight per  $1\text{cm}^2$  and weight ratio



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motivated by the desire to tailor the tackiness and drapability of the prepreg. (See Col 10, lines 60-63) Further, Ozaki et al. discloses when the component [C] is used for enhancing the inter-layer toughness of the composite material due to its high rupture elongation and high toughness, while the rigidity of the component [B] is used for providing the compressive strength of the composite material, it is recommended that the amount of the component [C] be present in a rather smaller amount in a range from 2 to 20 wt %, more preferably 4 to 13 wt %. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the percentages of each constituent motivated by expected success of tailoring the final properties of the prepreg to end use.

13. Claims 21-23 are rejected under 35 U.S.C. 103(a) as being obvious over Ozaki et al. (US 6,027,794) in view Zhou et al. (US 2002/0079052).

Regarding claim 21, Ozaki et al. discloses all of the claim limitations as set forth above but the reference does not specifically disclose the fiber-reinforced composite material comprises a honeycomb core. However, Ozaki et al. does disclose prepreg composites for the preparation of fiber reinforced plastics excellent in strength, elastic modulus, impact resistance and inter-layer toughness. (See Col 1, lines 5-10) It is further noted that there is no showing of record that the component [C] of Ozaki et al. would not display self-adhesion properties.

Zhou et al. discloses sandwich panels in which the face sheets are self-adhesive so that a separate adhesive film is not required for bonding to the core. (See [0003]) Zhou et al. discloses the self-adhesive prepregs include at least one fiber layer that is impregnated

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with a prepreg resin to form a prepreg which has a prepreg resin layer having a bonding surface which is bonded directly to the honeycomb during sandwich panel formation.

(See [0011]) Zhou et al. discloses prepreg face sheets which are bonded to a honeycomb core to form sandwich panels that are lightweight, structurally strong and exhibit many other desirable properties. (See [0010])

As Ozaki et al. and Zhou et al. are both directed to prepreg composite materials, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the honeycomb core of Zhou et al. with the fiber reinforced plastic prepregs of Ozaki et al. in order to provide for honeycomb sandwich panels that are lightweight, structurally strong and exhibit many other desirable properties. (See [0010])

Regarding claim 22, Ozaki et al. discloses prepregs, comprising long reinforcing fibers as components [A], a matrix resin as component [B] and long thermoplastic resin fibers as component [C], with the component [C] distributed near either or both of the surface layers without being regularly arranged. (See Abstract) Ozaki et al. the component [C] is made from long fibers of a thermoplastic resin and is distributed at random near the surface layer of the prepreg. The random distribution can also be realized by using a long-fiber nonwoven fabric. (See Col 8, lines 47-49 and 58-59) It is noted by examiner that applicant discloses that the element [C] as claimed means a thermoplastic fabric such as a nonwoven. (See [0064]) The prepregs are used for the preparation of fiber reinforced plastics. (See Col 1, lines 10-15)

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Zhou et al. discloses sandwich panels in which the face sheets are self-adhesive so that a separate adhesive film is not required for bonding to the core. (See [0003]) Zhou et al. discloses the self-adhesive prepregs include at least one fiber layer that is impregnated with a prepreg resin to form a prepreg which has a prepreg resin layer having a bonding surface which is bonded directly to the honeycomb during sandwich panel formation. (See [0011]) Zhou et al. discloses prepreg face sheets which are bonded to a honeycomb core to form sandwich panels that are lightweight, structurally strong and exhibit many other desirable properties. (See [0010])

The art is analogous as set forth above. It is noted by examiner that the combined disclosures of Ozaki et al. and Zhou et al. would provided for all the limitations as claimed by applicant. Specifically, Ozaki et al. discloses elements [A], [C], and [D] as set forth above. It is noted that the matrix resin of Ozaki is a cured matrix resin. (See Ozaki Col 3, lines 60-61) While Ozaki et al. is not explicit as to the final uses of the fiber reinforced plastics comprising the disclosed prepreg, Zhou et al. discloses component [E] for making sandwich panels and other related structural composite materials. (See Zhou [0010])

Regarding claim 23, as the structures of the combined references have been shown to be substantially similar to that as claimed by applicant and comprising all claimed elements, it is noted that the property of a climbing drum peel strength of 33 N•m/m or higher would have been readily provided for by the laminated material.

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14. Claims 26 and 28 are rejected under 35 U.S.C. 103(a) as being obvious over Ozaki et al. (US 6,027,794) as applied to claims 9 and 24 in view of Kishi et al. (EP 0559437) and further in view of Sugimori et al. (US 6,670,006).

Regarding claims 26 and 28, Ozaki et al. discloses all of the claim limitations as set forth above but the reference does not specifically disclose an epoxy resin comprising epoxy resins (a) and epoxy resin(b) as defined by applicant.

Kishi discloses a prepreg suitable for preparing honeycomb sandwich panels. (See Abstract) Kishi et al. discloses a resin composition including an epoxy resin, a curing agent and a rubber (preferably solid). (See pg. 3, lines 16-17) Kishi et al. discloses the epoxy resin may be a mixture of two or more epoxy resins. (See pg. 4, lines 6-8) Kishi et al. discloses an aromatic diamine may be used as the curing agent. (See pg. 4, lines 25-26) Kishi et al. discloses acrylonitrile-butadiene is the preferred rubber and may be 3-12 parts by weight in 100 parts by weight of the matrix resin composition. (See pg. 4, lines 48-51 and pg. 5, lines 20-23) Kishi et al. discloses the resin composition is used for a cured composite. (See Abstract)

As Ozaki et al. and Kishi et al. are both directed to preregs the art is analogous. Therefore, one of ordinary skill in the art would have been easily motivated by expected success to utilize the mixture of two epoxy resins as taught by Kishi et al. in place of the epoxy resin as disclosed by Ozaki et al. for the added benefit of tailoring heat resistance, water resistance and processibility. (See pg. 4, lines 5-10) Ozaki and Kishi et al. discloses all of the claim limitations as set forth above, but the reference is silent as to an

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epoxy resin having oxazolidone rings and an glass transition temperature of 160 to 220°C after heat curing at 180°C for 2 hours.

Sugimori et al. discloses an epoxy resin composition comprising an epoxy resin having oxazolidone rings (component B), and a curing agent (component C). (See Abstract) Sugimori et al. discloses the epoxy resin having oxazolidone rings is essential for high crushing strength. (See Col 4, lines 12-14) Sugimori et al. discloses the curing agent may be an amine compound. (See Col 5, lines 27-30) Sugimori et al. further discloses the composition may contain a component E selected from a glycidylamine-type resin.

As Kishi et al. and Sugimori et al. are both directed to curable epoxy resins, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art motivated by expected success to utilize the epoxy resin having oxazolidone rings as taught by Sugimori in the composition as disclosed by Kishi et al. since the Kishi reference discloses that a mixture of two or more epoxy resins may be used. It is noted by examiner that the composition of Sugimori et al. would have been well known in the art at the time of applicant's invention and therefore one of ordinary skill in the art would have been easily motivated to improve the crushing strength of the final resin for end use by utilizing an additional epoxy resin having oxazolidone rings. (See Col 4, lines 12-14)

As the composition of modified Ozaki et al. has been shown to be substantially similar in component make-up as that claimed by applicant, examiner has reason to believe that the glass transition temperature of 160 to 220°C after heat curing at 180°C for 2 hours would have been a result effective variable. It is noted that while Sugimori

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does not disclose the use of a solid rubber in the epoxy composition, the reference contains examples which provide evidence that the components of the composition would effect the glass transition temperature calculated. This is seen in Table 1 for a composition that comprises only components A, B, C, and E versus values calculated in Table 5 for a composition comprising components A, B, C, D, and E. Further, it is noted that one of ordinary skill in the art would have been easily motivated to adjust the time and temperature parameters of the curing conditions. Sugimori discloses curing conditions at 130°C for one hour. (See Col 13, lines 1-2) It would have been obvious to one having ordinary skill in the art at the time the invention was made to create curing parameters for obtaining a preferred glass transition temperature since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In the present invention, one would have been motivated to optimize the curing parameters for obtaining a preferred glass transition temperature with the desire to tailor the final cured product containing the epoxy resin for end use such as for structural components of airplanes, automobiles and the like. (See Kishi pg. 2, lines 9-14). Therefore, the claim limitations are met by the combined prior arts.

15. Claims 26 and 28 are rejected under 35 U.S.C. 103(a) as being obvious over Ozaki et al. (US 6,027,794) as applied to claims 9 and 24 in view of Kouchi et al. (WO 03/040206) and further in view of Kishi et al. (EP 0559437).

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This rejection is over WO 03/040206 because the reference qualifies as prior art under 102(b). However, for convenience, the column and line numbers of the English language equivalent and national stage entry, US 2004/0247882, will be cited below.

Regarding claims 26 and 28, Ozaki et al. discloses all of the claim limitations as set forth above, but the reference does not specifically disclose an epoxy resin comprising epoxy resins (a) and epoxy resin (b) as defined by applicant.

Kouchi et al. disclose a liquid epoxy resin composition for low cost production of high performance fiber reinforced composite material. (See [0015]) Kouchi discloses preferred epoxy resins comprise di- or higher functionality such as tetraglycidyl diamine diphenyl methane and an epoxy resin having oxazolidone rings. (See [0088]-[0089] and [0111]) Said epoxy resin compositions should, after being cured for two hours at 180°C, preferably have a glass transition temperature of 170°C or more. (See [0040]) Epoxy resin compositions for fiber reinforced composite material to be used in the aerospace industry are required to be small in the decrease in glass transition temperature caused by water absorption, as well as able to form a cured product with a high glass transition temperature. Accordingly, the epoxy resin composition according to the invention should, after being cured for two hours at 180°C and immersed in boiling water for 48 hours, preferably have a glass transition temperature of 130°C or more. (See [0141]) Kouchi et al. discloses by meeting these requirements, the resulting fiber reinforced composite material comprising a cured product of said epoxy resin composition as a matrix can have a high compressive strength in wet heat. (See [0044])

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As Ozaki et al. and Kouchi et al. are both directed to fiber reinforced composite materials, the art is analogous. Therefore, one of ordinary skill in the art would have been easily motivated by expected success to utilize the mixture of two epoxy resins as taught by Kouchi et al. in place of the epoxy resin as disclosed by Ozaki et al. for the added benefit of tailoring the glass transition temperature for the composite material in order to meet aerospace industry requirements. (See [0141]) Kouchi discloses all of the claim limitations as set forth above but does not disclose a solid rubber compound.

Kishi et al. discloses a resin composition including an epoxy resin, a curing agent and a rubber (preferably solid). (See pg. 3, lines 16-17) Kishi et al. discloses the epoxy resin may contain a glycidylamine type epoxy resin such as tetraglycidyl diaminodiphenylmethane. (See pg. 3, lines 53-56) Kishi et al. discloses the epoxy resin may be a mixture of two or more epoxy resins. (See pg. 4, lines 6-8) Kishi et al. discloses an aromatic diamine may be used as the curing agent. (See pg. 4, lines 25-26) Kishi et al. discloses acrylonitrile-butadiene is the preferred rubber and may be 3-12 parts by weight in 100 parts by weight of the matrix resin composition. (See pg. 4, lines 48-51 and pg. 5, lines 20-23) Kishi et al. discloses the resin composition is used for a cured composite. (see Abstract) Kishi et al. discloses all of the claim limitations as set forth above, but the reference is silent as to the an epoxy resin having oxazolidone rings and an glass transition temperature of 160 to 220°C after heat curing at 180°C for 2 hours.

As Kouchi et al. and Kishi et al. are both directed to curable epoxy resins, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art motivated by expected success to utilize the acrylonitrile-butadiene rubber as taught by



Kishi et al. in the composition as disclosed by Kouchi et al. for the added benefit of providing high viscosity and high thixotropic properties. (See pg.4, lines 45-46)

Therefore, the claim limitations are met by the combined prior arts.

16. Claim 27 is rejected under 35 U.S.C. 103(a) as being obvious over Ozaki et al. (US 6,027,794) in view Zhou et al. (US 2002/0079052) as applied to claim 22 and further in view of Kouchi et al. (WO 03/040206) and Kishi et al. (EP 0559437).

This rejection is over WO 03/040206 because the reference qualifies as prior art under 102(b). However, for convenience, the column and line numbers of the English language equivalent and national stage entry, US 2004/0247882, will be cited below.

Regarding claim 27, modified Ozaki et al. discloses all of the claim limitations as set forth above. Zhou et al. further discloses especially preferred are epoxy blends including a mixture of trifunctional epoxy and a difunctional bis-F epoxy. (See [0029]) However, the combined references do not specifically disclose an epoxy resin comprising epoxy resins (a) and epoxy resin (b) as defined by applicant.

Kouchi et al. disclose a liquid epoxy resin composition for low cost production of high performance fiber reinforced composite material. (See [0015]) Kouchi discloses preferred epoxy resins comprise di- or higher functionality such as tetraglycidylidiaminodiphenyl methane and an epoxy resin having oxazolidone rings. (See [0088]-[0089] and [0111]) Said epoxy resin compositions should, after being cured for two hours at 180°C, preferably have a glass transition temperature of 170°C or more. (See [0040]) Epoxy resin compositions for fiber reinforced composite material to be used in the aerospace industry are required to be small in the decrease in glass transition

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temperature caused by water absorption, as well as able to form a cured product with a high glass transition temperature. Accordingly, the epoxy resin composition according to the invention should, after being cured for two hours at 180°C and immersed in boiling water for 48 hours, preferably have a glass transition temperature of 130°C or more. (See [0141]) Kouchi et al. discloses by meeting these requirements, the resulting fiber reinforced composite material comprising a cured product of said epoxy resin composition as a matrix can have a high compressive strength in wet heat. (See [0044])

As modified Ozaki et al. and Kouchi et al. are both directed to fiber reinforced composite materials, the art is analogous. Therefore, one of ordinary skill in the art would have been easily motivated by expected success to utilize the mixture of two epoxy resins as taught by Kouchi et al. in place of the epoxy resin as disclosed by Ozaki et al. for the added benefit of tailoring the glass transition temperature for the composite material in order to meet aerospace industry requirements. (See [0141]) Kouchi discloses all of the claim limitations as set forth above but does not disclose a solid rubber compound.

Kishi et al. discloses a resin composition including an epoxy resin, a curing agent and a rubber (preferably solid). (See pg. 3, lines 16-17) Kishi et al. discloses the epoxy resin may contain a glycidylamine type epoxy resin such as tetraglycidyl diaminodiphenylmethane. (See pg. 3, lines 53-56) Kishi et al. discloses the epoxy resin may be a mixture of two or more epoxy resins. (See pg. 4, lines 6-8) Kishi et al. discloses an aromatic diamine may be used as the curing agent. (See pg. 4, lines 25-26) Kishi et al. discloses acrylonitrile-butadiene is the preferred rubber and may be 3-12 parts

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by weight in 100 parts by weight of the matrix resin composition. (See pg. 4, lines 48-51 and pg. 5, lines 20-23) Kishi et al. discloses the resin composition is used for a cured composite. (see Abstract) Kishi et al. discloses all of the claim limitations as set forth above, but the reference is silent as to the an epoxy resin having oxazolidone rings and an glass transition temperature of 160 to 220°C after heat curing at 180°C for 2 hours.

As Kouchi et al. and Kishi et al. are both directed to curable epoxy resins, the art is analogous. Therefore, it would have been obvious to one of ordinary skill in the art motivated by expected success to utilize the acrylonitrile-butadiene rubber as taught by Kishi et al. in the composition as disclosed by Kouchi et al. for the added benefit of providing high viscosity and high thixotropic properties. (See pg.4, lines 45-46) Therefore, the claim limitations are met by the combined prior arts.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

### ***Conclusion***

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALTREV C. SYKES whose telephone number is

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(571)270-3162. The examiner can normally be reached on Monday-Thursday, 8AM-5PM EST, alt Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on 571-272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/  
Supervisory Patent Examiner, Art Unit 1794

/ACS/  
Examiner  
2/27/09